Amendments to the Claims

Claims 1-35 are now cancelled.

Please add new claims 36--53 as follows:

36.   A corrosion sensor system comprising:

a reference module designed specifically for use in measuring the electrochemical

potential of the surface of a tank;

a measuring module connected to said reference module for measuring the amount of

protection current necessary for condition based monitoring and long term corrosion and coatings

assessment;

an electronic module connected to said reference module for monitoring and storing

potential and current data to allow for analysis of tank coatings degradation.

37.   The corrosion sensor system of claim 36, whose reference module further comprises:

a small hermetically sealed non-metallic enclosure, which contains two cable

interconnection connectors, a metallic threaded stud coupling for mounting and a 5-position

connector for attachment of the reference sensing element.

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38.   The corrosion sensor system of claim 37, wherein the reference module includes a multiple plug-in module array having a single cable interconnection and interconnects variable module quantities and cable lengths for use in measuring the tank electro-chemical potential of a surface of a tank at various heights and with multiple sensor modules, using the two cable interconnection connectors.

39.   The corrosion sensor system of claim 36, whose reference module determines the fill and empty operational cycle of the tank and used to document corresponding tank electrolyte depths concurrent with electro-chemical potential measurements.

40.   The corrosion sensor system of claim 36, whose reference module evaluates the growth of the calcareous deposits on the metal surface and surface corrosion based on the extent of polarization.

41.   The corrosion sensor system of claim 36, whose measuring module further comprises: a sacrificial metal which is electrically isolated from the tank structure using a rigid dielectric barrier and a connector to enable connection to the single interconnection cable.

42.   The corrosion sensor system of claim 36, whose measuring module measures, in-situ, an

amount of protection current by measuring the voltage drop across a shunt resistor connected to

the tank structure, thus providing a direct measurement of actual current necessary to protect the

tank.

43.   The corrosion sensor system of claim 36, whose measuring module current measurement

are used to define a protection current requirement, which is supplied by the structure's cathodic

protection galvanic anode system.

44.   The corrosion sensor system of claim 36, whose measuring module data, through direct

calculation by Faraday's Law, predicts the condition of permanently installed cathodic protection

anodes and the anticipated lifetime before exhaustion.

45.   The corrosion sensor system of claim 36, whose electronic module further comprises:

        an integral datalogger for data storage at the termination connection of the single

interconnect cable.

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46. The corrosion sensor system of claim 36, whose electronic module futher comprises a non-metallic enclosure which contains the datalogger, the location for the shunt resistor and connection for the hull grounding cable.

47. A corrosion sensor system of claim 36 capable of being utilized in seawater ballast tanks and compensated fuel tanks and, which can be utilized to indicate the relative location of coatings damage, tank protection polarization and prediction of galvanic anode system life, regardless of fuel properties.

48. A method for analyzing data acquired from the corrosion sensor system, comprising the steps for:

storing polarization data from the reference and measuring modules;

storing current data from the reference and measuring modules; and

combining said polarization and current data from the reference and measuring modules

to define a specific range level indicating relative levels of coating damage and tank protection.

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49. A method according to claim 48, wherein the step of combining further comprises:

ranking polarization levels of a tank into levels of,

less than –900 mV;

between -750 and -900mV; and

greater than -750mV.

50. A method, according to claim 48, wherein the step of combining further comprises:

ranking current levels of a tank into levels of,

less than 75mA;

between 75 and 175mA; and

greater than 175mA.

51. A method according to claim 48, further comprising:

performing trend analysis on said data from which, life-cycle maintenance decisions

concerning long-term behavior and changes in the relative location of coatings damage, tank

protection polarization

and performing prediction of galvanic anode system life to be monitored and documented

in a condition based maintenance approach.

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52. A method of installing a corrosion sensor system comprising the steps for:

attaching metallic studs to the tank wall at desired module locations for support

attaching reference modules to the welded studs of the tank at various heights

attaching measurement modules near the bottom of the tank

attaching a non-metallic enclosure to either the underside of the tank access hatch or

outside the tank at an accessible location

attaching a hull grounding cable to the tank structure or hull of ship or watercraft.

53. An installation method of the corrosion sensor system reference module and measuring

module, according to claim 52, further comprising the steps for:

connecting a desired number of reference modules and measuring module to the single

interconnect cable

connecting an interconnect cable to the non-metallic enclosure connector

installing a reference module "sensing element" into one of five locations provided on the

reference cell module connector, as to indicate specific location with respect to

other reference modules within the tank

programming the datalogger to incorporate the number of modules, sampling period and

start date.